

Application No. 09/821,618
Amendment Dated 9/23/05
Reply to Office Action of 7/27/05

This listing of claims will replace all prior versions, and listings, of claims in the application:

In the Claims:

1. (CURRENTLY AMENDED) A floating head liquid dispenser for dispensing liquid onto a substrate, comprising:

a support member mounted for linear movement toward and away from the substrate along a first axis;

a floating liquid dispensing head operatively connected to said support member and configured for floating linear movement relative to said support member along a second axis parallel to the first axis in response to contact of said liquid dispensing head with the substrate, said liquid dispensing head having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate; and

a linear displacement sensor having a first sensor component supported by and movable with said support member and a second sensor component supported by and movable with said liquid dispensing head, said linear displacement sensor being configured to generate a signal that indicates a sensed displacement of said liquid dispensing head relative to said support member in response to contact of said liquid dispensing head with the substrate.

2. (ORIGINAL) The floating head liquid dispenser of claim 1 wherein said linear displacement sensor comprises a linear encoder.

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3. (ORIGINAL) The floating head liquid dispenser of claim 2 wherein said linear encoder comprises an optical read head mounted on one of said support member and said liquid dispensing head, and a graduated linear scale mounted on said other capable of being read by said optical read head.

4. (PREVIOUSLY PRESENTED) The floating head liquid dispenser of claim 1 further comprising a robotic control mechanism operatively connected to said support member for moving said support member toward and away from the substrate along the first axis, said linear displacement sensor being coupled to said robotic control mechanism for applying the signal to said robotic control mechanism that indicates a sensed displacement of said liquid dispensing head relative to said support member.

5. (ORIGINAL) The floating head liquid dispenser of claim 4 wherein said robotic control mechanism is responsive to the signal applied from said linear displacement sensor to stop movement of said support member toward the substrate.

6. (ORIGINAL) The floating head liquid dispenser of claim 4 wherein said robot control mechanism is responsive to the signal applied from said linear displacement sensor to provide an alert.

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7. (CURRENTLY AMENDED) A floating head liquid dispenser for dispensing liquid onto a substrate, comprising:

a robotic control mechanism;

a support member operatively connected to said robotic control mechanism for linear movement toward and away from the substrate along a first axis under control of said robotic control mechanism;

a floating liquid dispensing head operatively connected to said support member and configured for floating linear movement relative to said support member along a second axis parallel to the first axis in response to contact of said liquid dispensing head with the substrate, said liquid dispensing head having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate; and

a linear encoder having a first sensor component supported by and movable with said support member and a second sensor component supported by and movable with said liquid dispensing head, and coupled to said robotic control mechanism, said linear encoder being configured to apply a signal to said robotic control mechanism that indicates a sensed displacement of said liquid dispensing head relative to said support member in response to contact of said liquid dispensing head with the substrate.

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8. (ORIGINAL) The floating head liquid dispenser of claim 7 wherein said linear encoder comprises an optical read head mounted on one of said support member and said liquid dispensing head, and a graduated linear scale mounted on said other capable of being read by said optical read head.

9. (ORIGINAL) The floating head liquid dispenser of claim 7 wherein said robotic control mechanism is responsive to the signal applied from said linear encoder to stop movement of said support member toward the substrate.

10. (ORIGINAL) The floating head liquid dispenser of claim 7 wherein said robot control mechanism is responsive to the signal applied from said linear encoder to provide an alert.

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11. (WITHDRAWN) A method of dispensing liquid onto a substrate from a floating head dispenser having a support member mounted for movement toward and away from the substrate and a liquid dispensing head mounted for movement relative to said support member and having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate, comprising the steps of:

moving the support member and the liquid dispensing head toward the substrate;

bringing the dispensing head and the substrate into engagement with one another;

displacing the dispensing head relative to the support member;

sensing displacement of the liquid dispensing head relative to the support member;

stopping movement of the support member toward the substrate when the displacement is sensed; and

dispensing liquid onto the substrate from the outlet.

12. (WITHDRAWN) The method of claim 11 further comprising the step of moving the support member and the liquid dispensing head with a robotic control mechanism.

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13. (WITHDRAWN) The method of claim 12 wherein the step of sensing displacement of the liquid dispensing head relative to the support member comprises operatively connecting a linear displacement sensor to the support member and the liquid dispensing head.

14. (WITHDRAWN) The method of claim 13 wherein the step of sensing displacement of the liquid dispensing head relative to the support member further comprises applying a signal from the linear displacement sensor to the robotic control mechanism that indicates displacement of the liquid dispensing head relative to the support member.

15. (WITHDRAWN) The method of claim 13 wherein the step of operatively connecting a linear displacement sensor to the support member and the liquid dispensing head comprises:

mounting an optical read head on one of the support member and the liquid dispensing head; and

mounting a graduated linear scale on the other.

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16. (WITHDRAWN) A method of dispensing liquid onto a substrate from a floating head dispenser having a support member mounted for movement toward and away from the substrate and a liquid dispensing head mounted for movement relative to said support member and having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate, comprising the steps of:

setting a range of acceptable dispensing positions of the liquid dispensing head;

moving the support member and the liquid dispensing head toward the substrate;

sensing displacement of the liquid dispensing head relative to the support member; and

stopping movement of the support member toward the substrate if the sensed displacement occurs outside of the set range of acceptable dispensing positions of the liquid dispensing head.

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17. (WITHDRAWN) A method of dispensing liquid onto a substrate from a floating head dispenser having a support member mounted for movement toward and away from the substrate and a liquid dispensing head mounted for movement relative to said support member and having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate, comprising the steps of:

setting a range of acceptable dispensing positions of the liquid dispensing head;

moving the support member and the liquid dispensing head toward the substrate;

sensing displacement of the liquid dispensing head relative to the support member; and

providing an alert if the sensed displacement occurs outside of the set range of acceptable dispensing positions of the liquid dispensing head.

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18. (WITHDRAWN) A method of dispensing liquid onto a substrate from a floating head dispenser having a support member mounted for movement toward and away from the substrate and a liquid dispensing head mounted for movement relative to said support member and having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate, comprising the steps of:

setting a range of acceptable dispensing positions of the liquid dispensing head;

moving the support member and the liquid dispensing head toward the substrate;

sensing for displacement of the liquid dispensing head relative to the support member; and

stopping movement of the support member toward the substrate if displacement of liquid dispensing head relative to the support member is not sensed within the set range of acceptable dispensing positions of the liquid dispensing head.

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19. (WITHDRAWN) A method of dispensing liquid onto a substrate from a floating head dispenser having a support member mounted for movement toward and away from the substrate and a liquid dispensing head mounted for movement relative to said support member and having a liquid flowpath extending therethrough terminating in an outlet for dispensing fluid onto the substrate, comprising the steps of:

setting a range of acceptable dispensing positions of the liquid dispensing head;

moving the support member and the liquid dispensing head toward the substrate;

sensing for displacement of the liquid dispensing head relative to the support member; and

providing an alert if displacement of the liquid dispensing head relative to the support member is not sensed within the set range of acceptable dispensing positions of the liquid dispensing head.